Women and Medicine

The Health of Adolescent Women in the 1980s

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The opportunities and stresses faced by today's adolescent women have the potential to affect their health, either directly or through interaction with biologic and psychosocial events. Recently achieved entry into the world of endurance and competitive sports; smoking, drug, and alcohol use; the toxic shock syndrome; and the acquired immunodeficiency syndrome threaten the health of young women today. Physicians who care for adolescent women in the 1980s and in the future will require special skills to do so successfully.

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Along with increasing opportunities and scientific advances geared to improving the health and social well-being of women in the past decade have come new and greater stresses and threats to their health. This is particularly true for adolescent women who must now contend not only with pubertal changes in their bodies but also with changing messages and expectations from the non-consensus society in which they are growing up. For physicians this presents an exciting challenge to preserve health and encourage health-promoting behaviors at this time of rapid physical and psychosocial growth along an uncharted path. To meet this challenge, this article will focus on the special health needs of adolescent girls.

Mortality data for adolescents show that the leading causes of death are automotive accidents, suicides, and homicides.[1] The incidence of death from each of these is considerably higher for male than for female adolescents, with the latter dying in accidents more often as passengers than as drivers and accounting for more suicide attempts than completed suicides.

Morbidity rates are perhaps more indicative of the health problems of adolescent females. First to be considered are those conditions that are directly related to their biology, the process of pubertal development. Puberty effects differences in body habitus between the sexes, in addition to the obvious secondary sex characteristics. A female adolescent increases her percent body fat from the unisex childhood figure of 8% to 22% by the completion of puberty. One potential advantage of increased adiposity in women is the increased buoyancy it produces, giving them an advantage in swimming events.

For the most part, however, the increased weight of puberty, coupled with the change in configuration of the female hip girdle, is viewed negatively by adolescent women of the 1980s.[2] Growing up in a society that values thinness as the idealized female form, adolescent women have been encouraged by the media and peers to diet and engage in unhealthful eating behaviors such as self-induced vomiting,[3] the use of laxatives, and, in some, a resort to anorexia nervosa or bulimia, the reported incidence of which has increased fourfold in the past two decades.[4] A primary care physician may be in a position to ameliorate these all-too-common sequelae by anticipating with a prepubertal child the bodily changes she is soon to experience in a positive light. For an already pubertal young woman, charting her height and weight on standardized growth curves to inject some reality-testing about the normalcy of her weight may prove helpful. If she persists in her desire to diet, providing a healthy weight-reduction regimen can be encouraged through the use of exercise and diet that results in no more than a 0.9-kg (2-lb) loss weekly. An early recognition of complex psychosocial problems followed by prompt expert counseling may prevent more serious eating disorders.

Puberty also results in a wider angle between the femur and the knee that, in combination with laxer ligaments, may predispose to increased injuries to the knees during athletic activity. Proper coaching and footgear should prevent this risk from being realized, however.

Most of the other physical changes of puberty also favor male athletes, who enjoy improved cardiac and pulmonary size and functional capacity, greatly increased musculature and, hence, strength, and an increased number of erythrocytes with resultant increased oxygen-carrying capacity compared with pubertal female athletes. The last effect is compounded by the physiologically determined lower hematocrit resulting from suppressed erythropoietin with increasing levels of estrogens during pubertal development, but also through increased iron losses through menstruation—if not experiencing athletic amenorrhea—through sweat, and through inadequate dietary intake. It is therefore not surprising that a recent study of adolescent cross-country runners found iron deficiency in female and male runners at the start of the season and at its completion.[5] Of great interest in this study was the finding that the majority had normal hematocrits and erythrocyte indices, with iron deficiency diagnosable only by determining ferritin levels. Physicians

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caring for adolescent female athletes should, therefore, determine the hematocrit, as well as ferritin levels, before, during, and after the competitive season; monitor diet to ensure adequate iron intake (18 mg elemental iron daily); and avoid prescribing nonsteroidal inflammatory drugs for minor injuries—if necessary, only with food—to avoid additional stool losses of blood that often result from this practice.

Other nutritional deficiencies that occur commonly among adolescent women who are weight conscious or athletes, or both, include those of calcium and zinc. Because of the image of milk products as being fattening, they are often shunned, and few get the four to six servings that provide the 2 grams of calcium needed to maintain the integrity of pubertal bone. The additional risk of osteoporosis posed by the estrogen deficiency caused by athletic amenorrhea in many of these women must also be recognized and, it is hoped, prevented by supplementing deficient diets. We have found that those who engage in restrictive dieting or rigorous exercise such as gymnastics or ballet dancing before puberty, with resultant pubertal delay, appear to be at particular risk for this complication.[6] Antacid products such as Tums E-X (calcium carbonate, 500 mg a tablet) provide 300 mg of absorbable elemental calcium for each tablet and are therefore convenient to use and less expensive than other supplements.

Zinc deficiency is more difficult to establish but should be suspected in young adolescents who do not get the recommended amount of animal protein in their diets. As cognitive development during adolescence not uncommonly results in idealism, vegetarianism often is espoused for the first time at this stage of life. Vegetarian adolescents can get a healthy, growth-promoting diet but require careful supervision to ensure an adequate intake of usable protein and vitamins.[7] Support from an understanding physician is crucial if this is to be successful.

One of the more obvious consequences of puberty is a change in the configuration, size, and function of reproductive organs. Ovulation and resultant menses or their absence may be problematic for an adolescent and are often responsible for the health problems of this age group.[8] Primary amenorrhea—the failure of menses to occur within two years of secondary sex characteristics or by age 16—may occur because of genetic disorders such as the Turner syndrome; congenital anomalies, such as an imperforate hymen; a central nervous system neoplasm, such as craniopharyngioma; disordered secretion of gonadotropin-releasing hormone by the hypothalamus; or gonadotropins by the pituitary (the polycystic ovary syndrome); chronic illness, such as cyanotic congenital heart disease or inflammatory bowel disease; starvation; stress (emotional or physical); or rigorous exercise. Secondary amenorrhea—the cessation of previously established menses for four or more months—may result from any of these, other than the genetic or congenital causes.

With the recent relaxing of restrictions preventing the involvement of women in competitive athletics has come the recognition of the phenomenon of "athletic amenorrhea."[9] There are a number of hypotheses as to its etiology, including the associated weight loss, low body fat, stress, or self-selection. Since the now controversial studies of Frisch and McArthur, it has been recognized that there is a relationship between body fat and menstrual function.[10] These authors suggested that a person must reach a critical weight of 48 kg (106 lb) or 17% body fat to have menarche and 22% body fat for normal monthly menses thereafter. Obese girls do have menarche earlier than those who are lean, and weight loss of as little as 10% in an obese woman may be sufficient to cause amenorrhea. Studies by Bullen and co-workers in which two groups of college women underwent identical programs of rigorous aerobic training resulted in amenorrhea only in the group that actually lost weight and not in the other, in which weight was experimentally maintained, supporting the weight-loss hypothesis.[11] On the other hand, there are a number of reports of athletes with body fat of less than 10% who menstruate normally and others showing that the menses resumed in athletes forced to rest following injury in whom there is no change in weight or body fat. Pubertal delay and primary amenorrhea in adolescent ballet dancers with body fat as high as 22% to 24% have been reported as well.[12] In this study, a rapid progression of pubertal development followed the forced cessation of training after an injury.

Emotional stress may trigger amenorrhea in adolescents, as seen in the well-recognized "boarding school syndrome" and reports of amenorrhea among concentration camp victims. Accordingly, it has been postulated that the stress of competition may be sufficient to cause athletic amenorrhea. This explanation has been challenged by Warren, who compared the age at menarche of ballet dancers with that of another group imbued with the stress of competition—namely, music students—and found the latter to have menarcheal ages similar to those of controls and considerably earlier than those of the athletes.[12]

The possible role of physical stress in the pathogenesis of athletic amenorrhea has been extensively explored. It has been shown that the incidence of amenorrhea, oligomenorrhea, and luteal phase defects increases with increasing duration and intensity of training. For example, the incidence of amenorrhea in women runners rises exponentially once they have exceeded 20 miles per week.[13] Studies of women under experimentally increasing intensity of physical training have shown increased levels of "stress" and "antireproductive" hormones and neurotransmitters, such as dopamine, endorphins, and norepinephrine.[14] On the other hand, similar levels of physical stress among athletes in sports other than running are not associated with the same incidence of amenorrhea. For example, world-class swimmers and volleyball players have an incidence of menstrual disorders comparable to that of nonathletes. Exploration of this observation to explain athletic amenorrhea is now timely. Malina has suggested that certain types of body habitus are desirable for different sports.[15] Accordingly, girls who are shorter and fatter than average are well suited for swimming, whereas taller, leaner girls with a lower upper-to-lower-body ratio make good sprinters, runners, or ballet dancers. These differences in body habitus are also related to differences in the timing of menarche, such that early maturing girls tend to be shorter and heavier and later maturers taller, leaner, and with a lower upper-to-lower-body ratio. Perhaps, according to Malina, there is self-selection favoring the choice of certain sports by those with different pubertal maturational patterns, rather than the sport causing the pubertal differences.[13]

Regardless of the cause of amenorrhea, physicians caring for adolescent amenorrheic athletes must first rule out causes other than athletics and, once that is done, work with the teenagers to prevent its sequelae. The possibility of hormonal replacement and calcium supplementation should be

carefully considered, particularly in a youngster with amenorrhea of more than a year's duration or one who is more than a year older than were other family members at the time of their menarche. If she is sexually active, oral contraceptives should be recommended to prevent both osteoporosis and pregnancy. In our experience, sexually active athletes—as well as patients with anorexia nervosa—who have amenorrhea typically decrease their pregnancy vigilance, occasionally with surprising and unfortunate outcomes. There are a few data to support the recommendation that competitive adolescent athletes with amenorrhea take the summer off from all athletics, after which menses may return. Alternatively, the menses have been restored by decreasing the frequency and intensity of training by 10%.[9]

Another common gynecologic problem of adolescent women is dysmenorrhea, the leading cause of short-term school absence among girls. A third of adolescent women suffer from incapacitating dysmenorrhea, yet they rarely seek help from physicians for this condition, perhaps having been conditioned by their mothers to "grin and bear it." Happily, in the 1980s this is no longer necessary, as the pathogenesis of dysmenorrhea is now known and its prevention possible. Because it is caused by increased levels of prostaglandins E_2 and $F_{2\alpha}$ in the endometrium, administering prostaglandin inhibitors, such as naproxen sodium—550 mg with the onset of the period and 275 mg every six hours thereafter for one to two days—is usually effective in preventing cramps. Alternatively, if the teenager is sexually active, ovulation can be inhibited, resulting in an alleviation of cramps, with a combination oral contraceptive. Failure of these approaches to prevent or treat dysmenorrhea is an indication for laparoscopy to explore the possibility that the pain is due to endometriosis, now recognized to begin during adolescence and often difficult to diagnose on the basis of a pelvic examination alone.[8]

The differential diagnosis, and hence the management of menometrorrhagia in adolescents, differs somewhat from that in older women. Possibilities to be considered include von Willebrand's disease when there is massive bleeding with the first menstrual period; a surreptitious misuse of oral contraceptives; and trauma or pregnancy that an embarrassed adolescent may be reluctant to reveal unless sensitively interviewed. The most common cause of excessive menstrual bleeding during the first postmenarcheal year, however, is anovulatory cycles. Unlike the management of older patients with heavy bleeding, a dilatation and curettage procedure rarely needs to be done in an adolescent with heavy bleeding as there is almost no risk for endometrial cancer. A tapering oral regimen of high-dose estrogen and progestin combinations or administering medroxyprogesterone acetate (Provera) is usually therapeutic.[8]

The selection of a contraceptive method with a sexually active adolescent must take into account the special biologic and psychosocial issues of this age group.[16] Biologic considerations include the following:

- A high incidence of dysmenorrhea that favors the use of ovulation-inhibiting oral contraceptives and argues against the use of an intrauterine device.
- The stage of pubertal growth may cause concern about administering estrogens to a youngster who has not yet completed her growth spurt. This is usually not an important consideration, as most girls have had menarche before becoming sexually active and are likely to have completed the growth spurt by that time. Moreover, the small amount of estrogen in oral contraceptive pills is unlikely to be adequate to inhibit growth.
- There is an increased risk of "post-pill amenorrhea" in those who had irregular menses or anovulatory cycles before using estrogen-containing oral contraceptives, and young teenagers should be informed of this possibility.
- The histologic characteristics of the early pubertal cervix, being largely composed of columnar epithelium, make it more susceptible to infection, contributing to the increased risk of contracting a sexually transmitted disease. The risk of infection with the human immunodeficiency virus (HIV), pelvic inflammatory disease, and other sexually transmitted diseases is substantial in this age group. The use of a condom and spermicidal foam provides excellent protection against these diseases—particularly HIV infection—and should be considered when both partners are motivated. Because of this increased susceptibility to sexually transmitted diseases—particularly salpingitis, with the risk of infertility as a result—the use of an intrauterine device should be discouraged.
- The high risk of the toxic shock syndrome in adolescents makes the use of any object that remains in the vagina for more than a few hours, such as a superabsorbent tampon, contraceptive sponge, or diaphragm, potentially dangerous.
- The serious medical consequences of pregnancy in those younger than 15 years remind us of the importance of using the most effective contraceptive method available and weighing its potential side effects against the possibly fatal complications of pregnancy itself in this age group.

The following psychosocial issues need to be assessed in choosing a contraceptive method with a teenager:

- Self-esteem, as it has been shown that poor self-esteem is associated with poor contraceptive compliance. Such a patient is probably a better candidate for a passive contraceptive method, such as an intrauterine device (generally contraindicated because of risk of infection), medroxyprogesterone (once this is again released for use), or close follow-up if another method is chosen.
- A need for confidentiality—that is, if a teenager is afraid of discovery of her contraceptive method by her parent(s), she is likely not to use it.
- Immature communication skills may make it difficult for an adolescent to discuss the need for protection with her boyfriend and may also limit her access to a health care facility to get contraception.
- Feeling invulnerable is common in this age group. This may lead a teenager to feel not at risk for pregnancy. Discussing reproductive physiology in a way that relates to the patient herself, such as by having her keep a basal body temperature chart to show when she is ovulating, may be useful.

Having just discussed care of sexually active adolescent girls, it is appropriate to expand the discussion to include those whose sexual activity is with a member of the same sex. Adolescent lesbians often need support in clarifying their sexual preference, protection against pregnancy or sexually transmitted diseases when trying to deny their sexual orientation, and assistance in dealing with their families.

Advances in equality between the sexes have had one

unfortunate consequence. Whereas previously the number of male adolescents who used drugs and alcohol and smoked far exceeded that of adolescent girls, the gap has rapidly narrowed. For example, 13.6% of female adolescents now smoke, compared with 13.1% of male adolescents.[17] The health-destroying effects are both immediate—a higher incidence of respiratory tract infections and decreased vital capacity—and long-range. For the first time in history, in 1985 the death rate from lung cancer exceeded that from breast cancer in women in eight states. Moreover, the reported antiestrogenic effects of smoking may result in an increased incidence of osteoporosis and, potentially, reproductive dysfunction in later life.[18]

The sex differences in metabolizing drugs and alcohol have only recently been recognized. For example, the effect of estrogen is to delay the metabolism of alcohol, with the end result that the same amount of alcohol produces a higher blood alcohol level in women than in male counterparts. There are also differences that relate to estrogen levels at different phases of the menstrual cycle and the use of estrogen-containing oral contraceptives. The puberty-related increase in adiposity also contributes to storage and release of fat-soluble substances. As a result of these phenomena, mostly unknown to adolescent women, they are at greater risk for toxicity, accidents, and legal consequences of their drinking than are their male peers.

Other sex differences in adolescent health problems relate to differences in sequelae. For example, sexually transmitted diseases have their highest incidence during adolescence, and female adolescents are at risk for the most severe of their complications—sterility. The risk of pregnancy as a result of adolescent experimentation with sexuality has already been discussed. Two preventable infectious diseases should also be considered. First, rubella now occurs in its highest incidence among adolescents, and immunosurveillance data suggest that about 5% of those who have been immunized in infancy no longer have protective titers.[19] As these youngsters approach their childbearing years, it is vitally important that their immunity be established by checking titers and by reimmunizing, if necessary. Second, the toxic shock syndrome, typically caused by the combination of a superabsorbant tampon and *Staphylococcus aureus,* occurs more frequently in adolescents than in adults.[20] Female adolescents should be informed about its prevention.

In summary, physicians who undertake the care of adolescent women will be successful to the extent that they allow adequate time for the patients to express their concerns, convey a message of respect for their privacy and emerging maturity, and are willing to maintain confidentiality. A knowledge of the biology of puberty and of psychosocial development will facilitate caring for adolescent women and improving their health status.

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